

Patent Claims

1. Electro-optical light modulation element comprising
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- a substrate or a plurality of substrates,
 - an electrode arrangement,
 - an element or a plurality of elements for polarisation of the light and
 - a modulation medium,
- characterised in that
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- the light modulation element is operated at the temperature at which the modulation medium in the unaddressed state is in an optically isotropic phase and
 - the mesogenic modulation medium comprises a chiral component, component (A), which consists of one or more chiral compounds and
 - the mesogenic modulation medium is operated at the temperature at which the light modulation element has a blue phase or
 - the mesogenic modulation medium is operated at the temperature at which the light modulation element is in the isotropic phase.
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2. Electro-optical light modulation element according to Claim 1, characterised in that
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- the electrode arrangement is able to generate an electric field having a significant component parallel to the surface of the mesogenic modulation medium.
3. Electro-optical light modulation element according to at least one of Claims 1 and 2, characterised in that
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- the mesogenic modulation medium has a blue phase.
4. Electro-optical light modulation element according to at least one of Claims 1 to 3, characterised in that
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- the mesogenic modulation medium comprises a chiral component, component (A), which consists of one or more chiral compounds.

5. Electro-optical light modulation element according to Claim 4, characterised in that
- 5 - the mesogenic modulation medium comprises an achiral component, component (B), which consists of one or more achiral compounds.
6. Electro-optical light modulation element according to at least one of Claims 1 to 5, characterised in that
- 10 - the relative temperature dependence (dV_{10}^*/dT) of the characteristic voltage for 10% relative contrast (V_{10}) of the modulation medium is 30%/degree or less at a temperature of 2° above the characteristic temperature ($T_{char.}$) in the range of $\pm 1^\circ$ around this temperature.
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7. Light modulation element according to at least one of Claims 1 to 6, characterised in that
- the relative temperature dependence (dV_{10}^*/dT) is 23%/degree or less.
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8. Light modulation element according to at least one of Claims 1 to 7, characterised in that
- the characteristic voltage for 10% relative contrast (V_{10}) at a temperature of 2° above the characteristic temperature ($T_{char.}$) of the modulation medium in cells is 80 V, preferably 60 V or less.
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9. Light modulation element according to at least one of Claims 1 to 8, characterised in that
- 30 - the mesogenic modulation medium comprises a chiral component, component (A), which consists of two or more chiral compounds.
10. Light modulation element according to Claim 9, characterised in that
- 35 - all the chiral compounds of component (A) have the same sign of the HTP at 20°C in the reference mixture.

11. Light modulation element according to at least one of Claims 9 and 10, characterised in that
- the value of the HTP of one or more of the chiral compounds of component (A) at 20°C in the reference mixture is 10 μm^{-1} or more.
12. Light modulation element according to at least one of Claims 1 to 11, characterised in that
- the mesogenic modulation medium comprises an achiral component, component (B), which consists of one or more achiral compounds.
13. Light modulation element according to at least one of Claims 1 to 12, characterised in that
- the dielectric susceptibility ($\epsilon_{av.}$) of the modulation medium at a temperature of 4 degrees above the conversion temperature from the blue phase or from the cholesteric phase into the isotropic phase is 40 or more, preferably 55 or more.
14. Light modulation element at least one of Claims 1 to 13, characterised in that
- the optical anisotropy at a temperature of 4 degrees below the transition temperature from the cholesteric phase into the isotropic phase is 0.050 or more, preferably 0.080 or more.
15. Electro-optical display containing one or more light modulation elements according to at least one of Claims 1 to 14.
16. Electro-optical display according to Claim 15, characterised in that the display is addressed by means of an active matrix.
17. Electro-optical display system containing one or more electro-optical displays according to at least one of Claims 15 and 16.

18. Electro-optical display system according to Claim 17, characterised in that it can be used as television screen, as computer monitor or as both.

5 19. Use of a light modulation element according to at least one of Claims 1 to 14 for the display of information.

10 20. Use of an electro-optical display according to at least one of Claims 17 and 18 in an electro-optical display system.

21. Use of an electro-optical display system according to at least one of Claims 17 and 18 for the display of video signals or of digital signals.

15 22. Mesogenic modulation medium for use in an electro-optical light modulation element, characterised in that it has an optically isotropic phase, preferably a blue phase, in the range from 0°C or below to 80°C or above.

20 23. Mesogenic modulation medium according to Claim 22, characterised in that it comprises
(a) a chiral component, component (A), which consists of one or more chiral compounds and
(b) optionally an achiral component, component (B), which consists of one or more chiral and/or achiral compounds.

25 24. Mesogenic modulation medium according to Claim 23, characterised in that it comprises an achiral component, component (B), which consists of one or more chiral and/or achiral compounds.

30 25. Mesogenic modulation medium according to Claim 24, characterised in that component (B) consists of one or more achiral compounds.

35 26. Medium according to Claim 24, characterised in that component (B) consists of one or more chiral compounds.

27. Medium according to at least one of Claims 22 to 26, characterised in that it has a characteristic temperature in the range from 0°C to 60°C.

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28. Medium according to at least one of Claims 22 to 27, characterised in that the blue phase has a temperature range of 5 degrees or more than 5 degrees.

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29. Medium according to Claim 28, characterised in that the blue phase has a temperature range of 10 degrees or more than 10 degrees.

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